Deoxygenation of heptanoic acid over alloyed-Pt catalysts: Model of terminal olefins production from fatty acids

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Terminal olefins (1-alkenes) are of importance for several industrial applications. In this work, the catalytic deoxygenation of heptanoic acid to 1-hexene was conducted at 400 °C under atmospheric H_2 in a fixed bed flow reactor. Heptanoic acid was employed as the model compound for the production of terminal olefins from fatty acids. Silica (titania)-supported Pt catalysts (0.5%), including the Pt alloyed with Sn (0.5%Pt, 0.2%Sn), were synthesized by spray impregnation using H_2PtCl_6 (and $SnCl_2$) as the corresponding metallic precursors. It was found that the Pt/SiO_2 catalyst exhibited decarboxylation activity, producing *n*-hexane as the main product. In contrast, the alloying of Pt by Sn suppresses the decarboxylation and hydrogenation activities, while promoting the decarbonylation activity. So, 1-hexene can be selectively produced (35% selectivity at 50% conversion). On the other hand, over the TiO_2 support (25% conversion), only the ketonization product (7-tridecanone, 95% selectivity) was produced.

Keywords: Deoxygenation, Heptanoic acid, 1-Hexene, $Pt\text{-}Sn/SiO_2$, $Pt\text{-}Sn/TiO_2$